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BOX PATENT APPLICATION
Assistant Commissioner for Patents
Washington, D.C. 20231

Re: Application of Koji NAGAO, Masaru FUKU, Keiichi ENOKI, Hirofumi
TATSUKAWA, Hisashi ISHIKURA, Toru MORITA, and Fumitaka SATOU
VEHICLE KEY SYSTEM
Our Reference: Q60516

Dear Sir:

Attached hereto is the application identified above including 25 pages of the specification, claims, and abstract, two (2) sheets of formal drawings, executed Assignment and PTO 1595 form, and executed Declaration and Power of Attorney. Also enclosed is the Information Disclosure Statement.

The Government filing fee is calculated as follows:

Total claims	12 - 20	=		x	\$18.00	=	\$0.00
Independent claims	2 - 3	=		x	\$78.00	=	\$0.00
Base Fee							\$690.00
TOTAL FILING FEE							\$690.00
Recordation of Assignment							\$40.00
TOTAL FEE							\$730.00

Checks for the statutory filing fee of \$690.00 and Assignment recordation fee of \$40.00 are attached. You are also directed and authorized to charge or credit any difference or overpayment to Deposit Account No. 19-4880. The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16 and 1.17 and any petitions for extension of time under 37 C.F.R. § 1.136 which may be required during the entire pendency of the application to Deposit Account No. 19-4880. A duplicate copy of this transmittal letter is attached.

Priority is claimed from March 21, 2000, based on Japanese Application No. 2000-078932. The priority document is enclosed herewith.

Respectfully submitted,
SUGHRUE, MION, ZINN,
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By: Robert I. Seas, Jr.
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VEHICLE KEY SYSTEM

BACKGROUND OF THE INVENTION

Field of the Invention

5 The present invention relates to a vehicle key system for verifying identity of fingerprint information captured and for controlling pieces of equipment in a vehicle according to the verification result. More particularly, it relates to a vehicle key system capable of switching between a plurality of processing modes by detecting a predetermined manipulation performed by users without having to provide an additional switch or the like intended for enabling users to perform switching between the plurality of processing modes, thereby reducing the cost of the system.

15 Description of the Prior Art

 In a conventional vehicle key system as disclosed in Japanese patent publication (TOKKOUHEI) 5-22791, fingerprint information captured by a sensor or the like is transmitted from a mobile transmitter to a receiver mounted on a vehicle and the fingerprint information is verified against pre-registered fingerprint information. The vehicle key system can release the lock of doors only if there is a match between them. When an authorized user wants to register information about the user's fingerprint, he or she has to manipulate a switch or the like to switch the system to a registration mode in which fingerprint information is captured from the user's finger and is registered to the system.

 Japanese patent application publications No.61-64977, No.11-93478, and No. 11-245771 disclose other conventional vehicle key systems, respectively.

A problem with conventional vehicle key systems constructed as above is that there is a need to provide a switch intended for switching between a plurality of fingerprint information processing modes, such as a verification mode in which identity of users is verified and a registration mode in which fingerprint information about a new user's fingerprint is registered, and therefore the cost of implementing the vehicle key system is increased because of the above-mentioned switch.

Another problem is that it is difficult to provide space for the above-mentioned switch intended for switching between the plurality of fingerprint information processing modes in a case that a number of switches are already provided, and therefore the switch is easy to manipulate by accident.

A further problem is that the provision of such a switch can cause users to touch the switch by mistake and then manipulate the switch by accident.

SUMMARY OF THE INVENTION

The present invention is proposed to solve the above problems. It is therefore an object of the present invention to provide a vehicle key system capable of detecting a predetermined manipulation performed by users and then switching between a plurality of processing modes according to the detected manipulation, without having to provide an additional switch or the like for enabling users to perform switching between the plurality of processing modes, thereby preventing users from switching the plurality of processing modes by accident and reducing the cost of the system.

In accordance with one aspect of the present invention,

there is provided a vehicle key system for verifying identity of fingerprint information about a user's fingerprint and for controlling pieces of equipment in a vehicle according to a verification result, the system comprising: a fingerprint information capturing unit for capturing fingerprint information from a user's fingerprint; a fingerprint information storage unit for pre-storing at least a piece of fingerprint information about an authorized user's fingerprint; a fingerprint verification unit for verifying identity of the fingerprint information captured by the fingerprint information capturing unit by comparing it with the authorized user's fingerprint information stored in the fingerprint information storage unit; a fingerprint information processing unit for performing a plurality of fingerprint processes in a plurality of processing modes, respectively; a manipulation detection unit for detecting at least one of a predetermined manipulation of an operation unit and a predetermined manipulation of a pedal; and a processing mode switching unit for switching between the plurality of processing modes according to the predetermined manipulation detected by the manipulation detection unit.

Preferably, the plurality of processing modes include a first processing mode in which the system can allow the user to use the vehicle after the fingerprint verification unit establishes the identity of the user's fingerprint information, and a second processing mode in which the system can register the user's fingerprint information to the fingerprint information storage unit. The processing mode switching unit can switch between the first and second processing modes according to the predetermined manipulation detected by the

manipulation detection unit.

Preferably, the plurality of processing modes further include a third processing mode in which the system can delete corresponding fingerprint information stored in the fingerprint information storage unit. In this case, the processing mode switching unit can switch between the first and third processing modes according to the predetermined manipulation detected by the manipulation detection unit.

Preferably, the plurality of processing modes further include a fourth processing mode in which the system can allow the user to use the vehicle without verification of the identity of the user's fingerprint information. In this case, the processing mode switching unit can switch between the first and fourth processing modes according to the predetermined manipulation detected by the manipulation detection unit.

Preferably, the plurality of processing modes include a first processing mode in which the system can allow the user to use the vehicle after the fingerprint verification unit establishes the identity of the user's fingerprint information, a second processing mode in which the system can register the user's fingerprint information to the fingerprint information storage unit, a third processing mode in which the system can delete corresponding fingerprint information stored in the fingerprint information storage unit, and a fourth processing mode in which the system can allow the user to use the vehicle without verification of the identity of the user's fingerprint information. In this case, the processing mode switching unit can switch between the first processing mode and either one of the second, third, and fourth processing modes according to the predetermined manipulation detected by the manipulation

detection unit.

The operation unit can be a wiper switch, a winker switch, or a shift lever. The pedal can be an acceleration pedal, a brake pedal, or a clutch pedal.

5 As an alternative, the operation unit can be a one intended for manipulating a navigation unit for providing a variety of navigation services, such as guidance on a route from a current position to a destination, for users.

10 In accordance with another preferred embodiment of the present invention, there is provided a vehicle key system for verifying identity of fingerprint information about a user's fingerprint and for controlling pieces of equipment in a vehicle according to a verification result, the system comprising: a fingerprint information capturing unit for capturing
15 fingerprint information from a user's fingerprint; a fingerprint information storage unit for pre-storing at least a piece of fingerprint information about an authorized user's fingerprint; a fingerprint verification unit for verifying identity of the fingerprint information captured by the
20 fingerprint information capturing unit by comparing it with the authorized user's fingerprint information stored in the fingerprint information storage unit; a fingerprint information processing unit for performing a plurality of fingerprint processes in a plurality of processing modes,
25 respectively; a connecting unit for connecting the system with a given external unit; a manipulation detection unit for detecting a signal applied thereto via the connecting unit, the signal indicating a predetermined manipulation of the external unit; and a processing mode switching unit for switching between
30 the plurality of processing modes according to the signal

detected by the manipulation detection unit.

Preferably, the plurality of processing modes include a first processing mode in which the system can allow the user to use the vehicle after the fingerprint verification unit establishes the identity of the user's fingerprint information, and a second processing mode in which the system can register the user's fingerprint information to the fingerprint information storage unit. The processing mode switching unit can switch between the first and second processing modes according to the signal detected by the manipulation detection unit.

Preferably, the plurality of processing modes further include a third processing mode in which the system can delete corresponding fingerprint information stored in the fingerprint information storage unit. In this case, the processing mode switching unit can switch between the first and third processing modes according to the signal detected by the manipulation detection unit.

Preferably, the plurality of processing modes further include a fourth processing mode in which the system can allow the user to use the vehicle without verification of the identity of the user's fingerprint information. In this case, the processing mode switching unit can switch between the first and fourth processing modes according to the signal detected by the manipulation detection unit.

Preferably, the plurality of processing modes include a first processing mode in which the system can allow the user to use the vehicle after the fingerprint verification unit establishes the identity of the user's fingerprint information, a second processing mode in which the system can register the

user's fingerprint information to the fingerprint information storage unit, a third processing mode in which the system can delete corresponding fingerprint information stored in the fingerprint information storage unit, and a fourth processing mode in which the system can allow the user to use the vehicle without verification of the identity of the user's fingerprint information. In this case, the processing mode switching unit can switch between the first processing mode and either one of the second, third, and fourth processing modes according to the predetermined manipulation detected by the manipulation detection unit.

Further objects and advantages of the present invention will be apparent from the following description of the preferred embodiments of the invention as illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing the structure of a vehicle key system according to a first embodiment of the present invention;

Fig. 2 is a state transition diagram showing state transitions between a plurality of processing modes which the vehicle key system according to the first embodiment can have;

Fig. 3 is a block diagram showing the structure of a vehicle key system according to a second embodiment of the present invention; and

Fig. 4 is a block diagram showing the structure of a vehicle key system according to a third embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Embodiment 1

Referring next to Fig. 1, there is illustrated a block diagram showing the structure of a vehicle key system according to a first embodiment of the present invention. In the figure, reference numeral 1 denotes an authentication unit for registering fingerprint information about fingerprints of authorized users thereto in advance.

The authentication unit 1 includes a fingerprint sensor 11 for illuminating a user's finger and detecting light reflected from the finger to capture a fingerprint image, a feature extracting unit 12 for extracting features, as fingerprint information, from the fingerprint image captured by the fingerprint sensor 11, a feature storage unit 13 for storing a list of pieces of fingerprint information about fingerprints of authorized users, i.e., a plurality of sets of features extracted from the fingerprints of authorized users, a fingerprint verification unit 14 for verifying the identity of the user by comparing the features extracted by the feature extracting unit 12 against the plurality of sets of features stored in the feature storage unit 13, and a control unit 15 for switching between a plurality of processing modes according to signals from a brake pedal sensor 4 for detecting a manipulation of a brake pedal and an accelerator pedal sensor for detecting a manipulation of an accelerator pedal, and for controlling a door lock driving unit 2 and an engine control unit or ECU 3, which are pieces of equipment in the vehicle, according to a verification result from a key ID acquiring unit 6 for verifying the identity of a key ID which the key ID acquiring unit 6 acquires from a mechanical key 7 and the

The door lock driving unit 2 can lock doors or release the lock of the doors according to a control signal from the control unit 15. The ECU 3 can allow or prohibit users to start the engine according to a control signal from the control unit 15. The brake pedal sensor 4 can detect a mechanical manipulation performed on a brake pedal not shown and generate an electrical signal indicating the mechanical manipulation to the control unit 15. The acceleration pedal sensor 5 can detect a mechanical manipulation performed on an acceleration pedal not shown and generate an electrical signal indicating the mechanical manipulation to the control unit 15. The key ID acquiring unit 6 can acquire a key ID from the mechanical key 7. Users can mechanically release the lock of doors using the mechanical key 7. The key ID assigned to the mechanical key 7 is used for the key ID acquiring unit 6 to determine whether or not the key 7 is an authorized key.

Referring next to Fig. 2, there is illustrated a state transition diagram showing state transitions between the plurality of processing modes which the vehicle key system according to the first embodiment can have. The control unit 15 switches a current processing mode between a fingerprint verification on mode and either one of a fingerprint verification off mode, a fingerprint information registration mode, and a fingerprint information delete mode. Initially, the system is in the fingerprint verification on mode.

While the system is in the fingerprint verification on mode, the feature extracting unit 12 can extract features from a user's fingerprint image captured by the fingerprint sensor 11 and the fingerprint verification unit 14 then compare the

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extracted features against the plurality of sets of pre-registered features stored in the feature storage unit 13. The fingerprint verification unit 14 then furnishes a signal indicating whether a match exists to the control unit 15. In
5 general, the features of a fingerprint include the size and contours of the fingerprint, the presence or absence of whorls, the number of ridges, and the orientations of streams of ridges. When the control unit 15 receives a signal indicating that a match exists, it controls the door lock driving unit 2 so as
10 to release the lock of doors and controls the ECU 3 so as to allow the user to start the engine. In contrast, when the control unit 15 receives a signal indicating that a match does not exist, it controls the door lock driving unit 2 so as to protect the lock of doors from being released and controls the
15 ECU 3 so as to prohibit the user from starting the engine. When no fingerprint information is registered in the feature storage unit 13, the user can release the lock of doors using the mechanical key 7 and enter the vehicle even in the fingerprint verification on mode.

20 While the system is in the fingerprint verification off mode, the control unit 15 can control the door lock driving unit 2 so as to release the lock of doors and control the ECU 3 so as to allow the user to start the engine, without performing the verification of the user's fingerprint. In this state, the
25 user can release the lock of doors and start the engine with the mechanical key 7. For example, when the user makes a request of an outsider who is not an authorized user, such as a clerk at a dealer or a door man at a hotel, to manage the vehicle temporarily, the user can switch the processing mode to the
30 fingerprint verification off mode.

While the system is in the fingerprint information registration mode, the feature extraction unit 12 can extract features from a user's fingerprint image captured by the fingerprint sensor 11 and the control unit 15 can store the extracted features in the feature storage unit 13.

While the system is in the fingerprint information delete mode, the control unit 15 can delete a set of features corresponding to the features extracted by the feature extracting unit 12 from the feature storage unit 13.

Next, a description will be made as to the operation of switching between the fingerprint verification on mode and either one of the fingerprint verification off mode, the fingerprint information registration mode, and the fingerprint information delete mode.

While the system is in the fingerprint verification on mode, the user can release the lock of doors and enter the vehicle if the fingerprint information about the user's fingerprint is already registered in the feature storage unit 13 of the authentication unit. Even when no fingerprint information is registered in the feature storage unit 13, the user can release the lock of doors using the mechanical key 7 and enter the vehicle. When the user then performs a manipulation on the brake pedal or the accelerator pedal without starting the engine, the brake pedal sensor 4 or the accelerator pedal sensor 5 detects the manipulation and then furnishes a signal indicating the manipulation to the control unit 15. When the manipulation is a predetermined one for triggering switching from the fingerprint verification on mode to the fingerprint information registration mode, the control unit 15 switches the current processing mode from the fingerprint verification on mode to

the fingerprint information registration mode. For example, when the user depresses the brake pedal eight times and also depresses the acceleration pedal ten times, the current processing mode is switched from the fingerprint verification on mode to the fingerprint information registration mode.

After that, the user can perform a predetermined manipulation to make the current processing mode revert back to the fingerprint verification on mode. As an alternative, the control unit 15 can be so constructed as to automatically make the current processing mode revert back to the fingerprint verification on mode after the features of the user's fingerprint have been registered, as fingerprint information, in the authentication unit.

The description will be directed to switching from the fingerprint verification on mode to the fingerprint information delete mode. When the user manipulates the brake pedal or the accelerator pedal without starting the engine, the brake pedal sensor 4 or the accelerator pedal sensor 5 detects the manipulation and furnishes a signal indicating the manipulation to the control unit 15. When the manipulation is a predetermined one for triggering switching from the fingerprint verification on mode to the fingerprint information delete mode, the control unit 15 switches the current processing mode from the fingerprint verification on mode to the fingerprint information delete mode. The predetermined manipulation differs from that to be done for triggering switching from the fingerprint verification on mode to the fingerprint information registration mode.

When the current processing mode is switched to the fingerprint information delete mode, the control unit 15 can

delete corresponding fingerprint features stored in the feature storage unit 13. After that, the user can perform a predetermined manipulation to make the current processing mode revert back to the fingerprint verification on mode. As an
5 alternative, the control unit 15 can be so constructed as to automatically make the current processing mode revert back to the fingerprint verification on mode after corresponding fingerprint features or corresponding fingerprint information has been deleted from the feature storage unit.

10 The description will be directed to switching from the fingerprint verification on mode to the fingerprint verification off mode. When the user performs a manipulation on the brake pedal or the accelerator pedal without starting the engine, the brake pedal sensor 4 or the accelerator pedal
15 sensor 5 detects the manipulation and furnishes a signal indicating to the manipulation to the control unit 15. When the manipulation is a predetermined one for triggering switching from the fingerprint verification on mode to the fingerprint verification off mode, the control unit 15 switches
20 the current processing mode from the fingerprint verification on mode to the fingerprint verification off mode. The predetermined manipulation differs from that to be done for triggering switching from the fingerprint verification on mode to the fingerprint information registration mode and that to
25 be done for triggering switching from the fingerprint verification on mode to the fingerprint information delete mode.

After that, the user can perform a predetermined manipulation to make the current processing mode revert back
30 to the fingerprint verification on mode.

As previously mentioned, when the user performs a predetermined manipulation on the brake pedal and/or the accelerator pedal, the control unit 15 performs switching between the plurality of processing modes. As an alternative,
5 an existing control switch or pedal intended for vehicles, such as a clutch pedal, a wiper switch, or a winker switch, can be manipulated by users when triggering switching between the plurality of processing modes. The fingerprint sensor can be disposed inside or outside the vehicle. The fingerprint sensor
10 can be a mobile one capable of transmitting the captured fingerprint image to the feature extracting unit 12 via radio frequencies.

As previously mentioned, in accordance with the first embodiment, the vehicle key system can detect a predetermined
15 manipulation, which is performed on the brake pedal and/or the acceleration pedal by users, by means of the brake pedal sensor 4 and the acceleration pedal sensor 5 and then switch the current processing mode between the plurality of processing modes according to the detected manipulation. Accordingly, the
20 first embodiment offers an advantage of being able to prevent users from switching the plurality of processing modes by accident, and to reduce the cost of the system because the system does not need an additional switch or the like for enabling users to perform switching between the plurality of processing modes.
25 In addition, since there is no need to machine the dashboard to mount the additional switch on the dashboard, the cost is further reduced.

Embodiment 2

30 Referring next to Fig. 3, there is illustrated a block

diagram showing the structure of a vehicle key system according to a second embodiment of the present invention. In the figure, reference numeral 21 denotes a navigation unit provided with an operation unit 26, such as a switch, for providing a variety of navigation services, such as guidance on a route from a current position to a destination, for users. The other components of Fig. 3 of the vehicle key system are the same as those of the aforementioned first embodiment, and therefore the description of the other components will be omitted hereinafter.

In the vehicle key system of the second embodiment, the operation unit 26 of the navigation unit 21 can also serve as an operation unit used for triggering switching between a plurality of processing modes. When a user performs a predetermined manipulation on the navigation unit 21 through the operation unit 26, the navigation unit 21 furnishes a signal indicating the predetermined manipulation to the control unit 15 to make it perform switching between the plurality of processing modes according to the signal applied thereto. Both the previous processing mode and the new processing mode can be displayed on the screen of a display unit (not shown) of the navigation unit 21. In each of the plurality of processing modes, the control unit 15 operates in the same way that that of the first embodiment does. Therefore, the description of the operation of the control unit 15 in each of the plurality of processing modes will be omitted hereinafter.

As previously mentioned, in accordance with the second embodiment, the vehicle key system can switch the current processing mode between the plurality of processing modes according to a predetermined manipulation performed on the

operation unit 26 of the existing navigation unit 21.

Accordingly, the second embodiment offers an advantage of being able to reduce the cost of the system because the system does not need an additional switch or the like for enabling users to perform switching between the plurality of processing modes, and to prevent users from switching the plurality of processing modes by accident. In addition, since the switching between the plurality of processing modes can be displayed on the screen of the display unit of the navigation unit, users can recognize the switching visually, thereby improving the convenience of the system.

Embodiment 3

Referring next to Fig. 4, there is illustrated a block diagram showing the structure of a vehicle key system according to a third embodiment of the present invention. In the figure, reference numeral 31 denotes a connector electrically connected to a failure diagnosis unit 41 provided with an operation unit (not shown), for carrying out failure diagnostic checks on vehicles. A control unit 15 can receive and transmit an electrical signal from and to the failure diagnosis unit 41 by way of the connector 31 when the failure diagnosis unit 41 is connected to the connector 31. The other components of Fig. 4 of the vehicle key system are the same as those of the aforementioned first embodiment, and therefore the description of the other components will be omitted hereinafter.

When the user wants to change the current processing mode, he or she connects the failure diagnosis unit 41 to the connector 31. When the user then performs a predetermined manipulation on the failure diagnosis unit 41 through the operation unit not

shown, the failure diagnosis unit 41 furnishes a signal indicating the predetermined manipulation to the control unit 15 by way of the connector 31 to make it perform switching between the plurality of processing modes according to the signal applied thereto. Both the previous processing mode and the new processing mode can be displayed on the screen of the display unit (not shown) of the failure diagnosis unit 41. In each of the plurality of processing modes, the control unit 15 operates in the same way that that of the first embodiment does. Therefore, the description of the operation of the control unit 15 in each of the plurality of processing modes will be omitted hereinafter.

As previously mentioned, in accordance with the third embodiment, the vehicle key system can switch the current processing mode between the plurality of processing modes according to a signal applied thereto by way of the existing connector 31 used for failure diagnosis indicating a predetermined manipulation performed on the operation unit not shown of the failure diagnosis unit 41. Accordingly, the third embodiment offers an advantage of being able to reduce the cost of the system because the system does not need an additional switch or the like for enabling users to perform switching between the plurality of processing modes, and to prevent users from switching the plurality of processing modes by accident. In addition, since the switching between the plurality of processing modes can be displayed on the screen of the display unit not shown of the failure diagnosis unit, users can recognize the switching visually, thereby improving the convenience of the system.

Many widely different embodiments of the present

WHAT IS CLAIMED IS:

1. A vehicle key system for verifying identity of fingerprint information about a user's fingerprint and for
5 controlling pieces of equipment in a vehicle according to a verification result, said system comprising:

a fingerprint information capturing means for capturing fingerprint information from a user's fingerprint;

a fingerprint information storage means for pre-storing
10 at least a piece of fingerprint information about an authorized user's fingerprint;

a fingerprint verification means for verifying identity of the fingerprint information captured by said fingerprint information capturing means by comparing it with the authorized
15 user's fingerprint information stored in said fingerprint information storage means;

a fingerprint information processing means for performing a plurality of processes on the fingerprint information captured by said fingerprint information capturing
20 means in a plurality of processing modes, respectively;

a manipulation detection means for detecting at least one of a predetermined manipulation of an operation unit for controlling the pieces of equipment in the vehicle and a predetermined manipulation of a pedal; and

25 a processing mode switching means for switching between the plurality of processing modes according to the predetermined manipulation detected by said manipulation detection means.

30 2. The vehicle key system according to Claim 1, wherein

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3. The vehicle key system according to Claim 1, wherein said plurality of processing modes include a first processing mode in which said system can allow the user to use the vehicle after said fingerprint verification means establishes the identity of the user's fingerprint information, and a second processing mode in which said system can delete corresponding fingerprint information stored in said fingerprint information storage means, and wherein said processing mode switching means switches between the first and second processing modes according to the predetermined manipulation detected by said manipulation detection means.

4. The vehicle key system according to Claim 1, wherein
25 said plurality of processing modes include a first processing
mode in which said system can allow the user to use the vehicle
after said fingerprint verification means establishes the
identity of the user's fingerprint information, and a second
processing mode in which said system can allow the user to use
30 the vehicle without verification of the identity of the user's

fingerprint information, and wherein said processing mode switching means switches between the first and second processing modes according to the predetermined manipulation detected by said manipulation detection means.

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5. The vehicle key system according to Claim 1, wherein said plurality of processing modes include a first processing mode in which said system can allow the user to use the vehicle after said fingerprint verification means establishes the identity of the user's fingerprint information, a second processing mode in which said system can register the user's fingerprint information to said fingerprint information storage means, a third processing mode in which said system can delete corresponding fingerprint information stored in said fingerprint information storage means, and a fourth processing mode in which said system can allow the user to use the vehicle without verification of the identity of the user's fingerprint information, and wherein said processing mode switching means switches between the first processing mode and either one of the second, third, and fourth processing modes according to the predetermined manipulation detected by said manipulation detection means.

6. The vehicle key system according to Claim 1, wherein said operation unit is a wiper switch, a winker switch, or a shift lever, and said pedal is an acceleration pedal, a brake pedal, or a clutch pedal.

7. The vehicle key system according to Claim 1, wherein said operation unit is a one intended for manipulating a

8. A vehicle key system for verifying identity of fingerprint information about a user's fingerprint and for controlling pieces of equipment in a vehicle according to a verification result, said system comprising:

a fingerprint information storage means for pre-storing at least a piece of fingerprint information about an authorized user's fingerprint;

a fingerprint information processing means for performing a plurality of processes on the fingerprint information captured by said fingerprint information capturing means in a plurality of processing modes, respectively;

a manipulation detection means for detecting a signal applied thereto via said connecting means, said signal indicating a predetermined manipulation of said external unit; and

a processing mode switching means for switching between the plurality of processing modes according to said signal detected by said manipulation detection means.

9. The vehicle key system according to Claim 8, wherein said plurality of processing modes include a first processing mode in which said system can allow the user to use the vehicle after said fingerprint verification means establishes the identity of the user's fingerprint information, and a second processing mode in which said system can register the user's fingerprint information to said fingerprint information storage means, and wherein said processing mode switching means switches between the first and second processing modes according to said signal detected by said manipulation detection means.

10. The vehicle key system according to Claim 8, wherein said plurality of processing modes include a first processing mode in which said system can allow the user to use the vehicle after said fingerprint verification means establishes the identity of the user's fingerprint information, and a second processing mode in which said system can delete corresponding fingerprint information stored in said fingerprint information storage means, and wherein said processing mode switching means switches between the first and second processing modes according to said signal detected by said manipulation detection means.

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11. The vehicle key system according to Claim 8, wherein said plurality of processing modes include a first processing mode in which said system can allow the user to use the vehicle after said fingerprint verification means establishes the identity of the user's fingerprint information, and a second

5 processing modes according to said signal detected by said
manipulation detection means.

12. The vehicle key system according to Claim 8, wherein said plurality of processing modes include a first processing mode in which said system can allow the user to use the vehicle after said fingerprint verification means establishes the identity of the user's fingerprint information, a second processing mode in which said system can register the user's fingerprint information to said fingerprint information storage means, a third processing mode in which said system can delete corresponding fingerprint information stored in said fingerprint information storage means, and a fourth processing mode in which said system can allow the user to use the vehicle without verification of the identity of the user's fingerprint information, and wherein said processing mode switching means switches between the first processing mode and either one of the second, third, and fourth processing modes according to the predetermined manipulation detected by said manipulation detection means.

ABSTRACT OF THE DISCLOSURE

A vehicle key system includes a fingerprint verification unit for verifying identity of fingerprint information captured by a fingerprint information capturing unit by comparing it with
5 a list of pieces of fingerprint information about fingerprints of authorized users stored in a fingerprint information storage unit. A manipulation detection unit can detect at least one of a predetermined manipulation of an operation unit, such as a wiper switch, a winker switch, or a shift lever, and a
10 predetermined manipulation of a pedal, such as an acceleration pedal, a brake pedal, or a clutch pedal. A processing mode switching unit can switch between a plurality of processing modes according to the predetermined manipulation detected by the manipulation detection unit.

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FIG.1

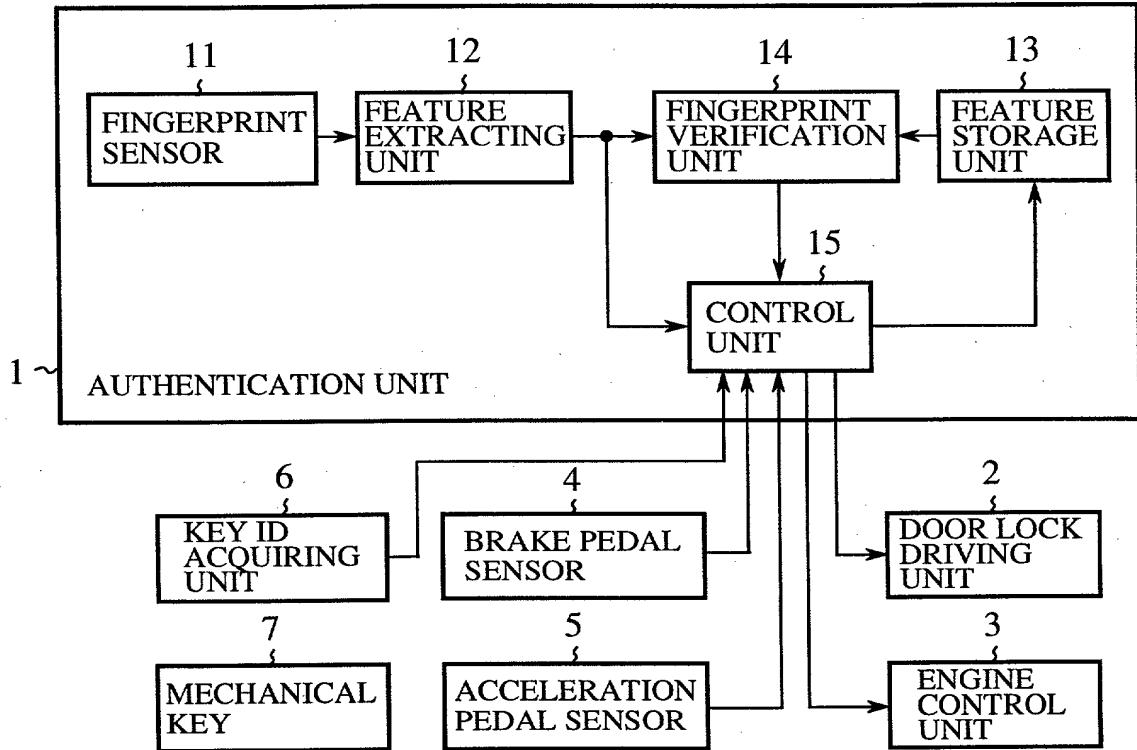


FIG.2

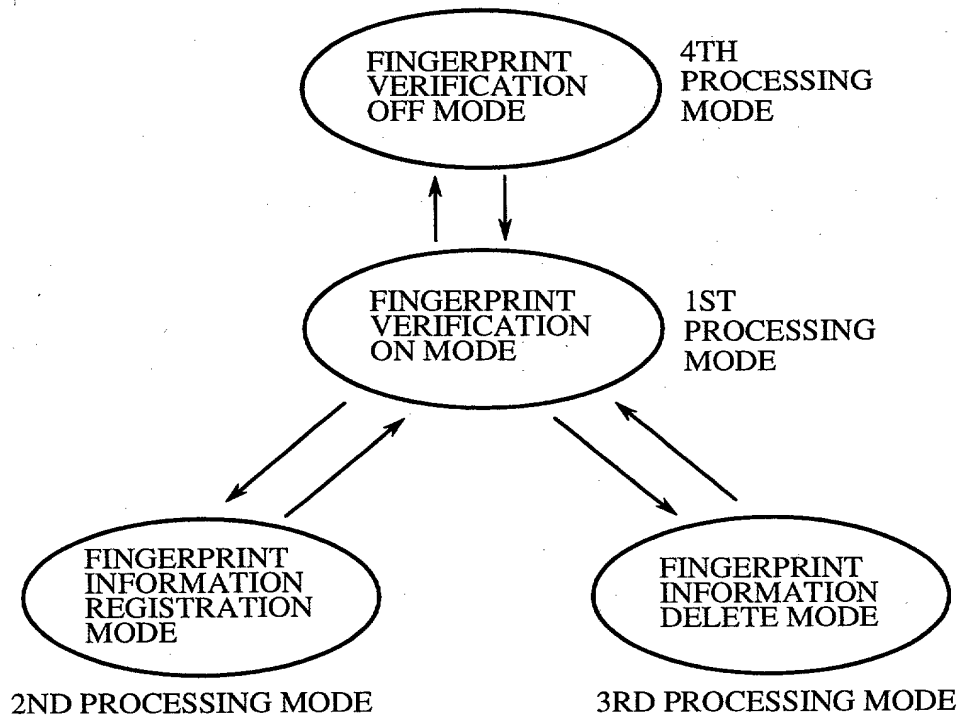


FIG.3

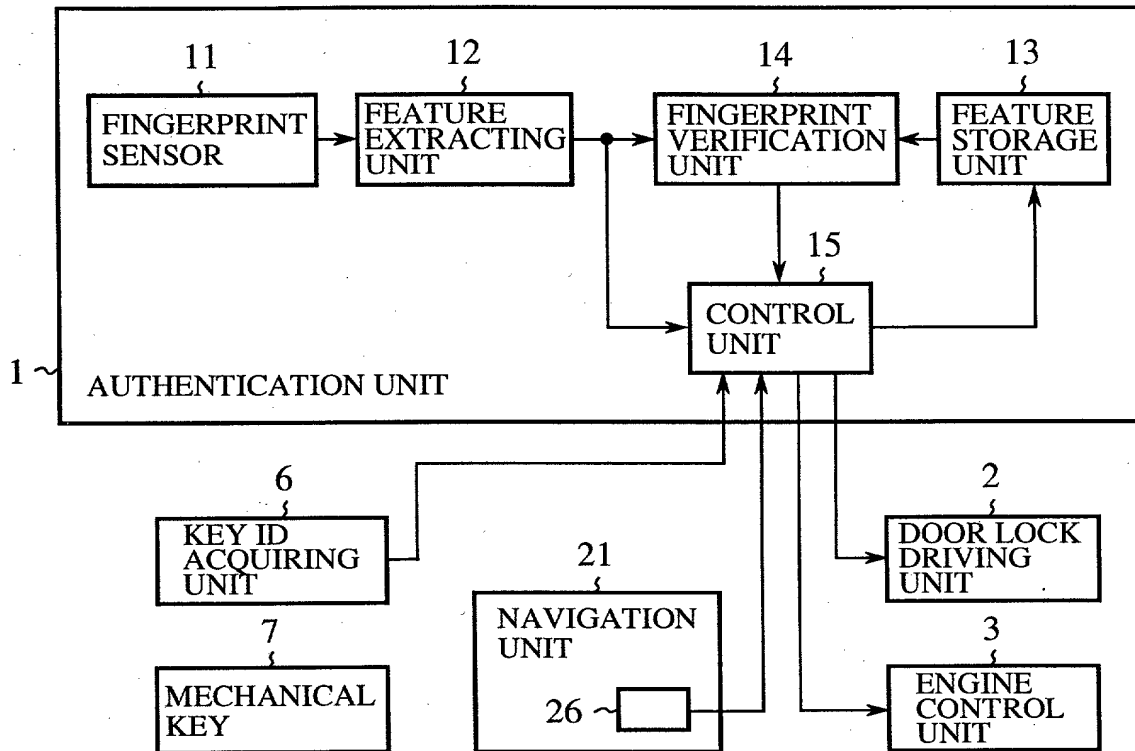
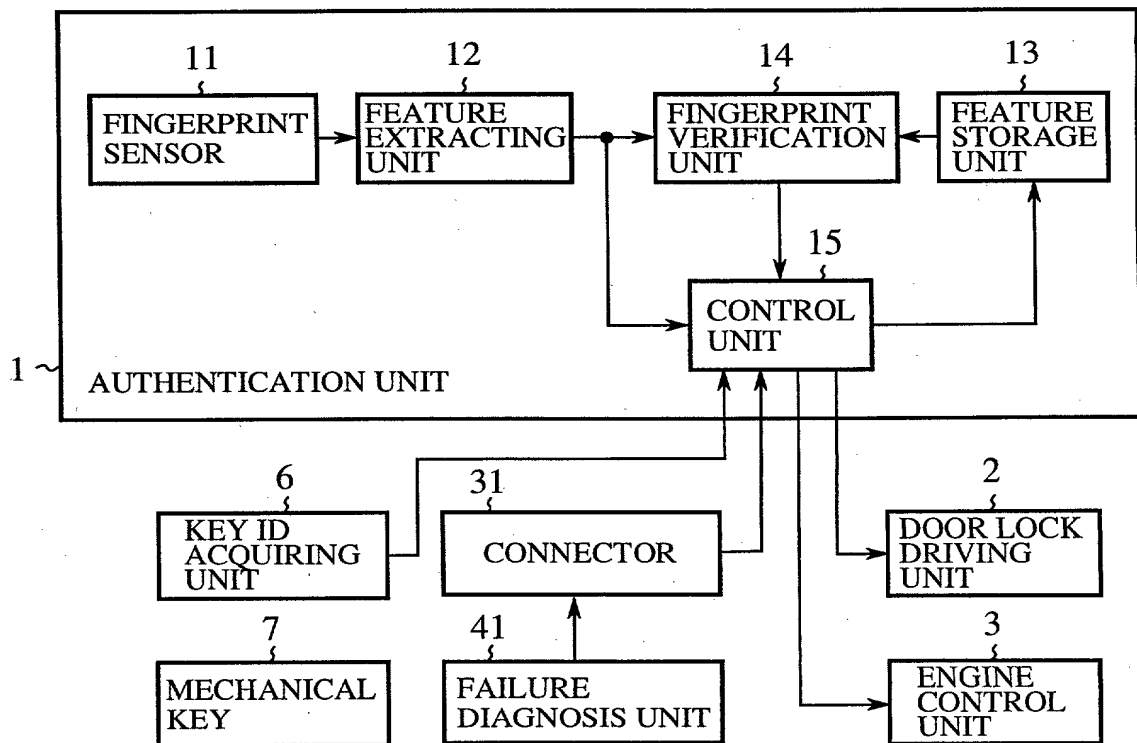


FIG.4



Declaration and Power of Attorney for Patent Application

特許出願宣言書

Japanese Language Declaration

私は、下欄に氏名を記載した発明として、以下の通り宣言する：

私の住所、郵便の宛先および国籍は、下欄に氏名に続いて記載したとおりであり、

名称の発明に関し、請求の範囲に記載した特許を求める主題の本来の、最初にして唯一の発明者である（一人の氏名のみが下欄に記載されている場合）か、もしくは本来の、最初にして共同の発明者である（複数の氏名が下欄に記載されている場合）と信じ、

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

"VEHICLE KEY SYSTEM"

その明細書を
(該当するほうに印を付す)

☐ ここに添付する。

☐ _____ 日に出願番号

第 _____ 号として提出し、

_____ 日に補正した。
(該当する場合)

the specification of which
(check one)

☒ is attached hereto.

☐ was filed on _____ as

Application Serial No. _____

and was amended on _____
(if applicable)

私は、前記のとおり補正した請求の範囲を含む前記明細書の内容を検討し、理解したことを陳述する。

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

私は、連邦規則法典第37部第1章第56条(a)項に従い、本願の審査に所要の情報を開示すべき義務を有することを認める。

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

Japanese Language Declaration

私は、合衆国法典第35部第119条、第172条、又は第365条に基づく下記の外国特許出願又は発明者証出願の外国優先権利益を主張し、さらに優先権の主張に係わる基礎出願の出願日前の出願日を有する外国特許出願又は発明者証出願を以下に明記する：

Prior foreign applications
先の外国出願

2000-78932	Japan	21/March/2000
(Number) (番 号)	(Country) (国 名)	(Day/Month/Year Filed) (出願の年月日)
_____ (Number) (番 号)	_____ (Country) (国 名)	_____ (Day/Month/Year Filed) (出願の年月日)
_____ (Number) (番 号)	_____ (Country) (国 名)	_____ (Day/Month/Year Filed) (出願の年月日)
_____ (Number) (番 号)	_____ (Country) (国 名)	_____ (Day/Month/Year Filed) (出願の年月日)
_____ (Number) (番 号)	_____ (Country) (国 名)	_____ (Day/Month/Year Filed) (出願の年月日)

Priority claimed

優先権の主張

<input checked="" type="checkbox"/>	<input type="checkbox"/>
Yes あり	No なし
<input type="checkbox"/>	<input type="checkbox"/>
Yes あり	No なし
<input type="checkbox"/>	<input type="checkbox"/>
Yes あり	No なし
<input type="checkbox"/>	<input type="checkbox"/>
Yes あり	No なし
<input type="checkbox"/>	<input type="checkbox"/>
Yes あり	No なし

私は、合衆国法典第35部第120条に基づく下記の合衆国特許出願の利益を主張し、本願の請求の範囲各項に記載の主題が合衆国法典第35部第112条第1項に規定の態様で先の合衆国出願に開示されていない限度において、先の出願の出願日と本願の国内出願日又はPCT国際出願日の間に公表された連邦規則法典第37部第1章第56条(a)項に記載の所要の情報を開示すべき義務を有することを認める。

I hereby claim the benefit of Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose any material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.) (出願番号)	(Filing Date) (出願日)	(現 況) 特許済み、係属中、放棄済み	(Status) (patented, pending abandoned)
_____ (Application Serial No.) (出願番号)	_____ (Filing Date) (出願日)	_____ (現 況) 特許済み、係属中、放棄済み	_____ (Status) (patented, pending abandoned)

私は、ここに自己の知識に基づいて行った陳述がすべて真実であり、自己の有する情報及び信ずるところに従って行った陳述が真実であると信じ、更に故意に虚偽の陳述等を行った場合、合衆国法典第18部第1001条により、罰金もしくは禁固に処せられるか、又はこれらの刑が併科され、又はかかる故意による虚偽の陳述が本願ないし本願に対して付与される特許の有効性を損なうことがあることを認識して、以上の陳述を行ったことを宣言する。

I hereby declare that all statements made herein of my own knowledge are true; and further that all statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Japanese Language Declaration

委任状： 私は、下記発明者として、以下の代理人をここに
選任し、本願の手続きを遂行すること並びにこれに関する一
切の行為を特許商標局に対して行うことを委任する。
(代理人氏名及び登録番号を明記のこと)

POWER OF ATTORNEY: As a named inventor, I hereby
appoint the following attorney(s) and/or agent(s) to
prosecute this application and transact all business in the
Patent and Trademark Office connected therewith (list
name and registration number)

I hereby appoint John H. Mion, Reg. No. 18,879; Donald E. Zinn, Reg. No. 19,046; Thomas J. Macpeak, Reg. No. 19,292;
Robert J. Seas, Jr., Reg. No. 21,092; Darryl Mexic, Reg. No. 23,063; Robert V. Sloan, Reg. No. 22,775; Peter D. Olexy, Reg.
No. 24,513; J. Frank Osha, Reg. No. 24,625; Waddell A. Biggart, Reg. No. 24,861; Robert G. McMorrow, Reg. No. 19,093;
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26,916; Joseph J. Ruch, Jr., Reg. No. 26,577; Sheldon I. Landsman, Reg. No. 25,430; Richard C. Turner, Reg. No. 29,710;
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No. 33,276; Bruce E. Kramer, Reg. No. 33,725; Paul F. Neils, Reg. No. 33,102; and Brett S. Sylvester, Reg. No. 32,765, my
attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith, and
request that all correspondence about the application be addressed to SUGHRUE, MION, ZINN, MACPEAK & SEAS, PLLC, 2100
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書類の送付先：

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Direct Telephone Calls to: (name and telephone number)

(202)293-7060

唯一の又は第一の発明者の氏名	Full name of sole or first inventor Masaru FUKU	
同発明者の署名	日付	Inventor's signature Masaru Fuku Date August 11, 2000
住所	Residence Tokyo, Japan	
国籍	Citizenship Japanese	
郵便の宛先	Post office address c/o MITSUBISHI DENKI KABUSHIKI KAISHA 2-3, Marunouchi 2-chome, Chiyoda-ku, Tokyo 100-8310 Japan	
第二の共同発明者の氏名 (該当する場合)	Full name of second joint inventor, if any Keiichi ENOKI	
同第二発明者の署名	日付	Second inventor's signature Keiichi Enoki Date August 11, 2000
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国籍	Citizenship Japanese	
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(第三又はそれ以降の共同発明者に対しても同様な情報
および署名を提供すること。)

(Supply similar information and signature for third and
subsequent joint inventors.)

第三の共同発明者の氏名 (該当する場合)	Full name of third joint inventor, if any Hirofumi TATSUKAWA
同第三発明者の署名 日付	Third inventor's signature Hirofumi TATSUKAWA Date August 11, 2000
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国籍	Citizenship Japanese
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第四の共同発明者の氏名 (該当する場合)	Full name of fourth joint inventor, if any Hisashi ISHIKURA
同第四発明者の署名 日付	Fourth inventor's signature Hisashi Ishikura Date August 11, 2000
住所	Residence Tokyo, Japan
国籍	Citizenship Japanese
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第五の共同発明者の氏名 (該当する場合)	Full name of fifth joint inventor, if any Toru MORITA
同第五発明者の署名 日付	Fifth inventor's signature Toru Morita Date August 11, 2000
住所	Residence Tokyo, Japan
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第六の共同発明者の氏名 (該当する場合)	Full name of sixth joint inventor, if any Fumitaka SATOU
同第六発明者の署名 日付	Sixth inventor's signature Fumitaka Satou Date August 11, 2000
住所	Residence Tokyo, Japan
国籍	Citizenship Japanese
郵便の宛先	Post office address c/o MITSUBISHI DENKI KABUSHIKI KAISHA 2-3, Marunouchi 2-chome, Chiyoda-ku, Tokyo 100-8310 Japan

第七の共同発明者の氏名 (該当する場合)		Full name of seventh joint inventor, if any Koji NAGAO	
同 第七発明者の署名	日付	Seventh inventor's signature Koji Nagao	Date August 11, 2000
住所		Residence Tokyo, Japan	
国籍		Citizenship Japanese	
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第八の共同発明者の氏名 (該当する場合)		Full name of eighth joint inventor, if any	
同 第八発明者の署名	日付	Eighth inventor's signature	Date
住所		Residence	
国籍		Citizenship	
郵便の宛先		Post office address	
第九の共同発明者の氏名 (該当する場合)		Full name of ninth inventor, if any	
同 第九発明者の署名	日付	Ninth inventor's signature	Date
住所		Residence	
国籍		Citizenship	
郵便の宛先		Post office address	
第十の共同発明者の氏名 (該当する場合)		Full name of tenth joint inventor, if any	
同 第十発明者の署名	日付	Tenth inventor's signature	Date
住所		Residence	
国籍		Citizenship	
郵便の宛先		Post office address	